

L7464

**GREATER TORONTO AREA 3Rs ANALYSIS
SUMMARY REPORT - METRO TORONTO
AND YORK REGION**

DRAFT - NOVEMBER 1993



**Ministry of
Environment
and Energy**



ISBN 0-7778-2080-3

GREATER TORONTO AREA 3Rs ANALYSIS
SUMMARY REPORT - METRO TORONTO AND YORK REGION

Prepared by M.M. Dillon Ltd.
for
Fiscal Planning and Information Management Branch
Ministry of Environment and Energy

DRAFT - NOVEMBER 1993



Ce document existe aussi en français.
Pour obtenir un exemplaire, ou pour de plus amples
renseignements, en français, veuillez composer le
1-800-463-8484

Copyright: Queen's Printer for Ontario, 1993
This publication may be reproduced for non-commercial purposes
with appropriate attribution.

This report was prepared for the Ontario Ministry of Environment and Energy as part of a Ministry-funded project. Mention of trade names or commercial products does not constitute endorsement or recommendation of their use.

TABLE OF CONTENTS

	Page
1.0 BACKGROUND	1
2.0 PURPOSE OF STUDY	1
3.0 STUDY APPROACH	2
3.1 Study Process Overview	2
3.2 Overview of the Alternative System Development Process	5
3.3 Identification of Alternative 3Rs Systems	6
4.0 CONSULTATION ON GTA 3RS ANALYSIS	9
4.1 Stage 1 - Consultation Program	9
4.2 Stage 2 - Review of Waste Management Initiatives and Related Consultation Programs	10
4.3 Stage 3 - Future Consultation Activities	10
5.0 SYSTEM NET EFFECTS ANALYSIS	11
5.1 System Net Effects Analysis Approach	11
5.1.1 Evaluation Criteria	11
5.1.2 Evaluation Criteria Ranking	11
5.1.3 Net Effects Analysis	14
5.2 Metro Toronto Residential Systems Evaluation	14
5.2.1 Cost Criteria Group - Overall System Ranking	14
5.2.2 Municipal Finance Criteria Group - Overall System Ranking ..	15
5.2.3 Natural Environment Criteria Group - Overall System Ranking	16
5.2.4 Service Criteria Group - Overall System Ranking	17
5.2.5 Social Environment Criteria Group - Overall System Ranking ..	19
5.3 York Region Residential Systems Evaluation	20
5.3.1 Cost Criteria Group - Overall System Ranking	20
5.3.2 Municipal Finance Criteria Group - Overall System Ranking ..	21
5.3.3 Natural Environment Criteria Group - Overall System Ranking	22
5.3.4 Service Criteria Group - Overall System Ranking	23
5.3.5 Social Environment Criteria Group - Overall System Ranking ..	24

TABLE OF CONTENTS
(continued)

	Page
5.4 GTA IC&I Systems Evaluation	25
5.4.1 Cost Criteria Group - Overall System Ranking	25
5.4.2 Municipal Finance Criteria Group - Overall System Ranking ..	26
5.4.3 Natural Environment Criteria Group - Overall System Ranking	26
5.4.4 Service Criteria Group - Overall System Ranking	27
5.4.5 Social Environment Criteria Group - Overall System Ranking ..	28
6.0 DIVERSION ESTIMATES FOR METRO TORONTO AND YORK REGION	29
7.0 CONCLUSIONS	30

1.0 BACKGROUND

In 1989, the government of Ontario announced its commitment to meeting a Provincial target of at least 50% reduction of waste going to landfills and incineration by the year 2000. This target, a waste **diversion** target to be achieved through waste reduction, reuse and recycling (the 3Rs), was confirmed by the present government in 1990.

To facilitate the achievement of the 50% target, the Province introduced the *Waste Management Act*, 1992. The Act broadens the government's powers to reduce waste sent to disposal through a variety of means. It also vests powers in the Interim Waste Authority (IWA), an agency created to ease the waste disposal crisis in the Greater Toronto Area (GTA). The IWA is complying with its mandate by conducting environmental assessments to locate three long-term landfill sites in the GTA.

2.0 PURPOSE OF STUDY

This study has two purposes, each of which relates directly to a requirement created by the *Waste Management Act*.

The first requirement pertains to waste estimates. Section 14 of the *Waste Management Act* requires the Minister of Environment and Energy to provide a written estimate as to:

- a) *the amount of waste that would otherwise be expected to be generated in the primary service area (i.e. each of Peel, Durham and Metro/York) during a twenty-year period that will not be generated because of waste reduction efforts; and*
- b) *the amount of waste that will be generated in the primary service area during a twenty-year period that will not need to be disposed of in the site because of the reuse or recycling of materials that are or could become waste.*

These waste estimates were provided to the IWA by Minister's letter dated May 15, 1992 (Appendix A). The current study provides additional analysis of 3Rs activities, in support of the waste diversion estimates previously provided.

The second requirement pertains to analysing the 3Rs as "alternatives to" landfill waste disposal sites. Section 15 of the *Waste Management Act* requires that the IWA environmental assessments contain a description of, and statement of rationale for the 3Rs,

as well as evaluate matters relating to the 3Rs as an alternative to the landfill waste disposal sites. By administrative agreement, MOEE committed to provide such a rationale and evaluation to the IWA for use in its environmental assessments.

3.0 STUDY APPROACH

For purposes of the present analysis, an array of conceptually different 3Rs systems have been identified for addressing residential wastes, as well as for institutional, commercial, and industrial (IC&I) wastes. For each system, estimates of the amount of waste the system could potentially divert from disposal have been determined. An assessment, done on a non-site-specific, generic level, identifies the advantages and disadvantages to the environment of each potential 3Rs system, in keeping with the *Environmental Assessment Act*.

The study area for the GTA 3Rs Analysis is the area encompassing Metro Toronto and the Regional Municipalities of Durham, York, Peel and Halton. Metro Toronto/York Region, Durham Region and Peel Region are defined as the "primary service areas". The Region of Halton has been included as part of the study area as it is part of the GTA. It is not, however, one of the three "primary service areas" as it has recently obtained approval for a landfill site, and is not part of the IWA siting process. The residential 3Rs systems were analyzed in the context of each of the four municipalities of Metro Toronto, York, Peel and Durham. The IC&I systems were analyzed in the context of the larger GTA (i.e. including Halton) as IC&I waste management systems transcend municipal boundaries.

3.1 Study Process Overview

The GTA 3Rs Analysis identifies and assesses alternative 3Rs systems, comprised of combinations of 3Rs programs, technologies and practices, that could reasonably be implemented in the GTA. It also determines the potential for each 3Rs system to divert waste over the twenty-year minimum life expectancy of the GTA landfill sites, and identifies the advantages and disadvantages of each system.

The study process selected was one modelled on the intent and requirements of the *EA Act*. Specifically, the study process:

- considered a reasonable range of alternatives;
- considered the full definition of the environment;

- systematically evaluated the net environmental effects of the options being considered; and
- considered public views on waste diversion.

Figure 2.1 presents the study process.

Key to the design of alternative systems was to identify the Existing 3Rs system within each of the Regional Municipalities (Step 1). The Existing system or "do nothing" alternative was identified as the 3Rs system in place within each Regional Municipality as of December 31, 1992. The Existing system was described for both the residential/municipal sector for each Regional Municipality, and for the IC&I sector at the GTA level.

Using the Existing system as a base, the next step (Step 2) was to identify Regional, Municipal, Provincial and Federal, five year 3Rs commitments. Once identified, these 3Rs commitments were then translated into components and added to the Existing system to form the Existing/Committed system (January 1, 1993 to December 31, 1997).

The alternative diversion themes were then developed by the study team¹ (Step 3). These represented the conceptual waste diversion options which are/can be expected to be available. The diversion themes identified by the study team were then used to develop a long list of waste diversion components which served as the building blocks for the system development (Step 4). Included in this long list were components suggested by the public and identified by the study team from existing reports and past public consultations (Step 5).

The long list of components was then screened (Step 6) using three criteria.

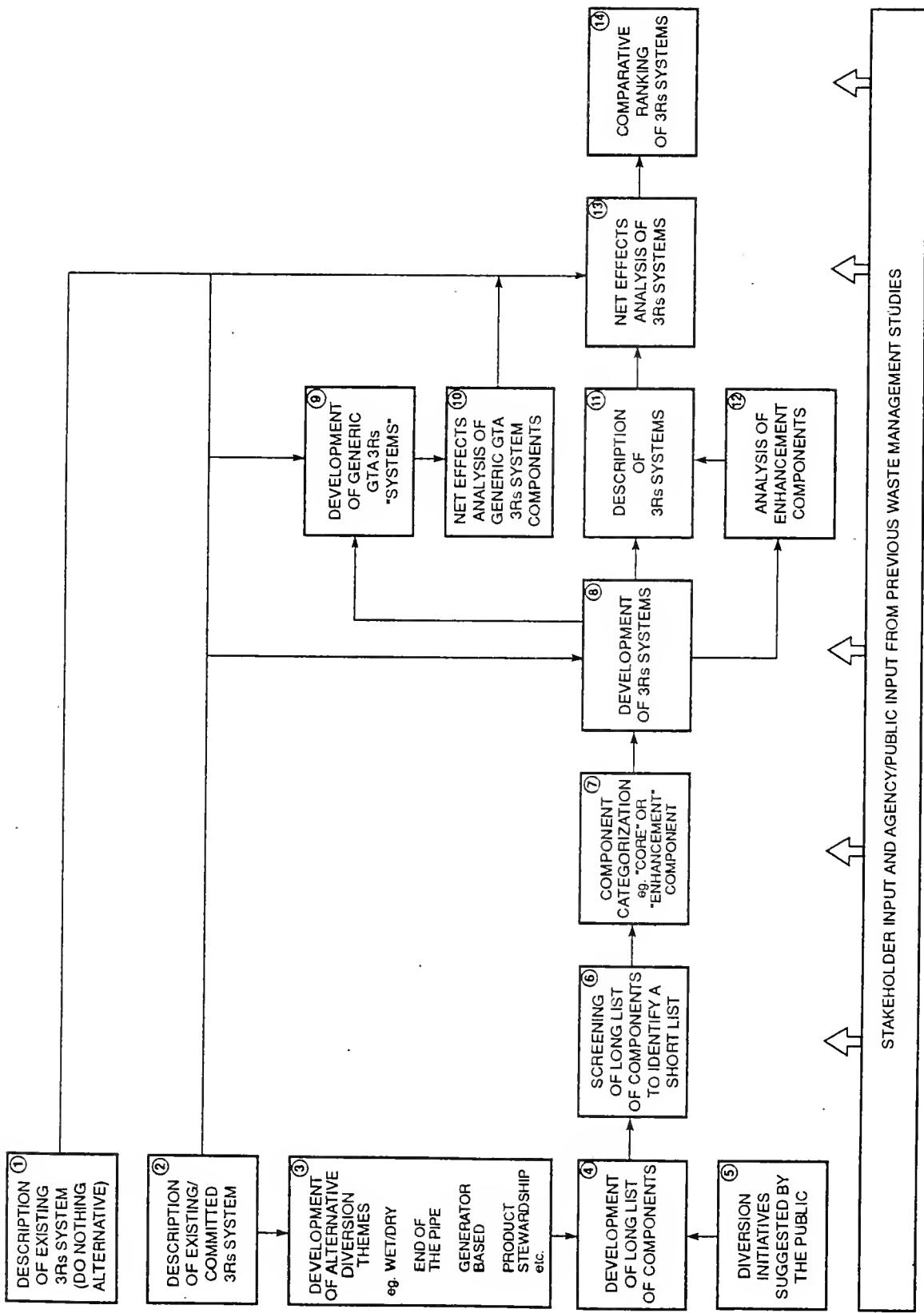
To pass the screen and proceed to the next step in the evaluation, each component was judged to:

- represent a proven technology, technique or program;
- satisfy government standards and regulations; and
- divert a reasonable quantity of waste from disposal.

Step 6 screening identified a short list of alternative 3Rs system components.

¹ The study team was managed by MOEE's Fiscal Planning and Information Management Branch and included four separate consulting firms.

GTA 3Rs SYSTEM DEVELOPMENT AND EVALUATION APPROACH



The short listed components were then categorized as either core or enhancement components (Step 7). Core components served as the focus for alternative system development.

Enhancement components could be added to systems to enhance system performance and increase waste diversion. Enhancement components were further divided into primary and secondary enhancement component categories. Primary enhancement components (e.g. promotion and education) are proven to add an important element that would contribute to the function of a waste diversion system. Secondary enhancement components could be added to systems to increase waste diversion but were not considered critical to their function. Only core and primary enhancement components were included in alternative waste diversion systems developed for analysis in the GTA.

Based on the categorized components, alternative systems were then developed (Step 8) and then described (Step 11).

The next step was to determine the net effects of each system on the basis of the following criteria groups: Cost, Municipal Finance, Natural Environment, Service and Social Environment.

Recognizing the amount of overlap between the Regional systems, a net effects analysis at a GTA level was first done on all the components found within each of the systems developed for each of the Regional Municipalities (Steps 9 and 10). The components and their net effects were then recombined into the Regionally based 3Rs systems to create the Net Effects Analysis for each individual system for each Region (Step 13).

Based on the net effects, the final step of the study process was the ranking of each alternative system within each criterion group (Step 14).

3.2 Overview of the Alternative System Development Process

A total of six residential and six IC&I waste diversion systems were developed for comparison in the GTA 3Rs Analysis. In order to conduct this analysis, a methodical system development process was undertaken. The objective was to group together a wide range of alternative waste diversion components into logical systems which could potentially be used for waste diversion, without undue complexity, in the GTA. The method used for system development is illustrated in Figure 2.2.

The systems were developed to provide a basis for comparing alternative waste diversion approaches. No attempt was made to analyze all possible systems, nor was this an attempt to provide conclusive recommendations of preferred systems for waste diversion in GTA Regions. The range of alternative systems developed was however considered to be reasonable for the GTA. It will also be the municipalities themselves who decide which system is most appropriate considering their own local issues/conditions.

The system development process consisted of six steps:

1. Defining Key Assumptions
2. Identifying Waste Diversion Themes
3. Identifying Long List of Components
4. Screening Long List of Components
5. Developing Potential Alternative Residential Waste Diversion Systems for the GTA.
6. Developing Potential Alternative IC&I Waste Diversion Systems for the GTA.

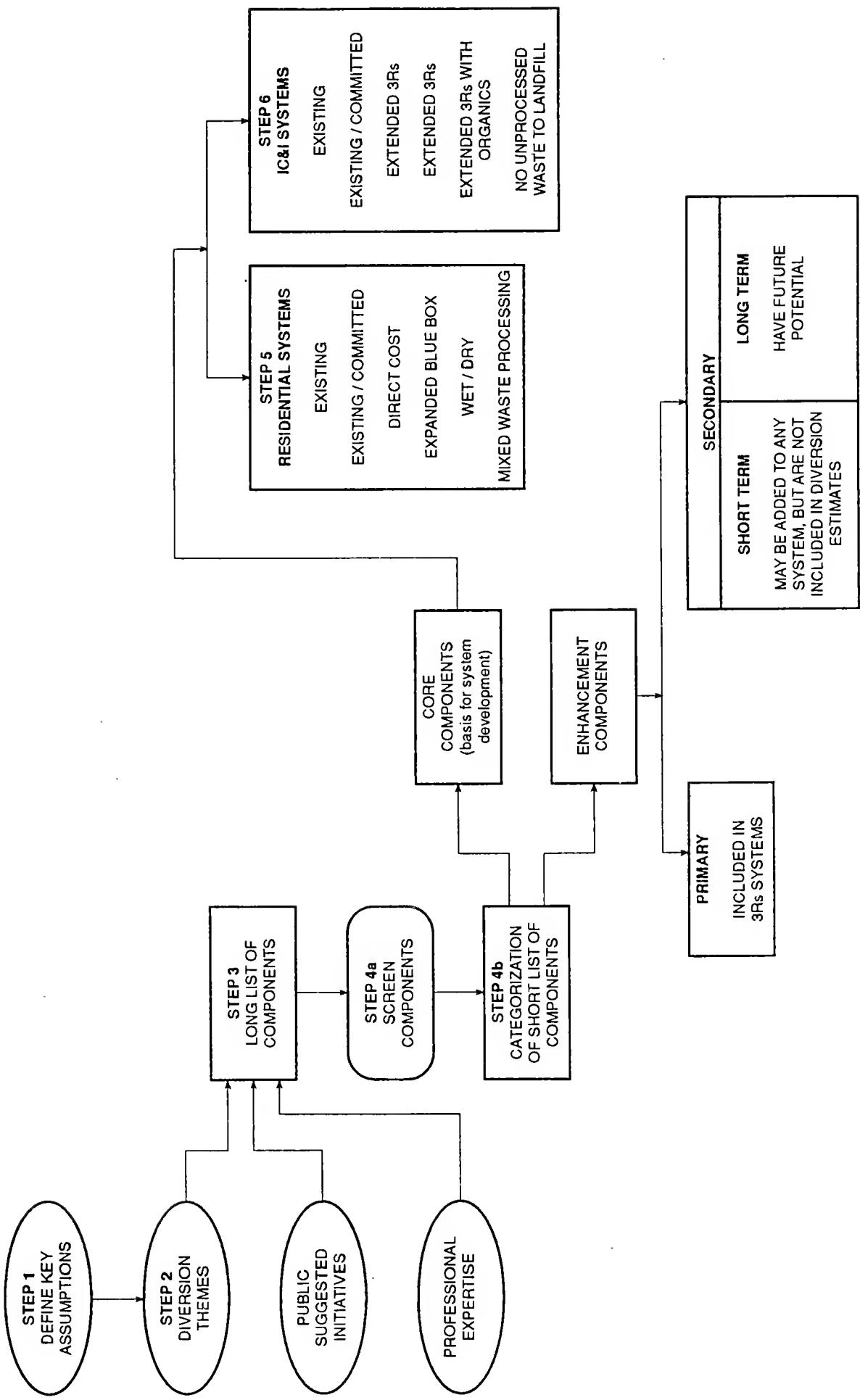
3.3 Identification of Alternative 3Rs Systems

For each Region, six residential 3Rs systems were developed and evaluated. These systems were:

Residential

Residential System 1 - Existing - the residential 3Rs system which was in place in each Region on December 31, 1992.

Residential System 2 - Existing/Committed - the Existing system, to which are added policies announced by December 31, 1992, and programs committed in municipal five-year budgets (to the end of 1997).



**GTA 3Rs ANALYSIS
3Rs SYSTEM DEVELOPMENT PROCESS**

Residential System 3 - Direct Cost - builds on the Existing/Committed system which includes a charge to the homeowner for garbage collection and uses Blue Box programs, backyard composting and curbside collection of leaf and yard waste.²

Residential System 4 - Expanded Blue Box - range of dry recyclables collected at the curb is expanded, and household organics (food and yard waste) are managed through backyard composters and separate collections of leaf and yard waste.

Residential System 5 - Wet/Dry - household waste is collected in three streams including wet (food and yard wastes), dry recyclables, and garbage. A centralized composting facility processes the wet wastes.

Residential System 6 - Mixed Waste Processing - includes Blue Box collection of recyclables, separate collection of leaf and yard waste, backyard composting of some household wet waste and processing of the remaining "third bag" of waste in a mixed waste processing and composting plant.³

For the GTA as a whole, six 3Rs systems to handle industrial, commercial and institutional (IC&I) waste were also developed. These were:

IC&I

IC&I System 1 - Existing - comprises the IC&I waste management system in place in the GTA on December 31, 1992.

IC&I System 2 - Existing/Committed - the Existing system with policy commitments announced at the local, Regional, Provincial, and Federal levels by December 31, 1992.

² It should be noted that System 3 (Direct Cost) was further subdivided as System 3A (Direct Cost - revenue neutral) and System 3B (Direct Cost - added revenue). Only the Municipal Finance Criteria Group considered these two scenarios in the net effects analysis.

³ System 6 (Mixed Waste Processing) included two scenarios: 1) System 6A - low quality compost; 2) System 6B - high quality compost. These two scenarios address the different ranges of compost quality and end-use possibilities.

IC&I System 3 - Extended 3Rs Regulations⁴ - the Existing/Committed system plus an extension of the proposed 3Rs regulations to include more IC&I waste generators.

IC&I System 4 - Expanded 3Rs Regulations⁴ - the Existing/Committed system plus extension of the proposed 3Rs Regulations to include more IC&I waste generators and source separation of a larger range of dry materials by the IC&I sector.

IC&I System 5 - Expanded 3Rs Regulations⁴ with Organics - builds on System 4 and includes wet wastes in materials requiring source separation by the IC&I sector.

IC&I System 6 - Processing All IC&I Waste - builds on the Existing/Committed IC&I system, but would require that all IC&I waste be processed prior to landfilling.

4.0 CONSULTATION ON GTA 3RS ANALYSIS

The purpose of the consultation program for the GTA 3Rs Analysis is to identify and consider the views and suggestions of relevant stakeholders. Stakeholders include both members of the public and government agencies. Consultation is occurring over three stages.

4.1 Stage 1 - Consultation Program

The Stage 1 consultation program conducted for the GTA 3Rs analysis project commenced on June 4, 1992, at the same time the IWA announced its Long List of Candidate Landfill Sites. At this time, the consultation focus was on the GTA waste diversion estimates provided by the Minister to the IWA on May 15, 1992.

As part of this consultation program, representatives of the Ministry also met with Regional Consultation Networks (RCN) (multi-stakeholder committees representing various interests in each Primary Service Area which have met throughout the IWA process).

⁴ The draft 3Rs Regulations were announced by the MOEE in April 1993, and include provisions for mandatory source separation programs, waste audits and packaging audits for designated IC&I sectors. For a general description see *Quick Facts: Ontario's New 3Rs Regulations* (PIBS 2528b: MOEE, Spring 1993).

4.2 Stage 2 - Review of Waste Management Initiatives and Related Consultation Programs

The GTA 3Rs Analysis study team also examined past (GTA and Provincial) waste management initiatives and the results of the consultation conducted for these. Materials from the following studies were reviewed:

- **Solid Waste Environmental Assessment Project (SWEAP) Metro Toronto;**
- **Solid Waste Interim Steering Committee (SWISC) approach to landfill siting and waste management;**
- **Waste Reduction Office Waste Management Initiatives Papers; and**
- **IWA Landfill Site Search Public Consultation Documentation.**

As outlined, the results of the IWA's consultations were reviewed with particular notice paid to comments made on 3Rs within the GTA. Information collected was reviewed and considered at various stages of the project. As most of the comments identified were suggested 3Rs initiatives which should be considered, public comments were primarily used in developing the long list of 3Rs components and subsequent system development.

4.3 Stage 3 - Future Consultation Activities

In the Fall of 1993 and early 1994, the study team will undertake further consultation on the EA Input document, in co-ordination with the IWA. Activities are planned to inform the public, municipalities and government agencies of the results of the GTA 3Rs analysis and to request their comments on the methods, assumptions and information used in the analysis, as well as the study results. This summary report is one informational tool to be used in Stage 3 consultation.

Based on input received from all of the above consultation activities, data will be updated and the final draft EA Input Document revised for formal submission to the IWA.

5.0 SYSTEM NET EFFECTS ANALYSIS

5.1 System Net Effects Analysis Approach

The following describes the approach followed in the net effects analysis and evaluation.

5.1.1 Evaluation Criteria

Based on the study team's understanding of the issues and scope of the study, a set of criteria and indicators was developed as presented in Table 5.1.

These criteria were categorized under the following criteria groups:

- Cost;
- Municipal Finance;
- Natural Environment;
- Service; and
- Social Environment.

These criteria groups formed the basis of the 3Rs systems evaluations within each Region.

5.1.2 Evaluation Criteria Ranking

To facilitate the ranking of systems on the basis of each criteria group, the criteria within each criteria group were ranked in terms of their level of importance. The criteria rankings group were used consistently for each Region, due to the generic nature of the analysis and similarities among the study areas. For example, the type of natural environment effects in Durham would likely be similar to effects in Peel.

The rankings range from 1 (most important) to 3 (least important) and are based on a comparison of each criterion against the others in that group.

TABLE 5.1
**GTA 3Rs ANALYSIS
 ALTERNATIVE SYSTEM EVALUATION CRITERIA
 RESIDENTIAL AND IC&I**

Criteria Group/Criteria	Rank*	Indicator
Cost (Residential)		
Cost per Household (system)	NR**	<ul style="list-style-type: none"> the cost of the waste management system including diversion and disposal on a per household basis
Cost (IC&I)		
Diversion System Cost	2	<ul style="list-style-type: none"> the cost of the diversion system as expressed as cost per tonne diverted
Total System Cost	1	<ul style="list-style-type: none"> the cost of the total waste management system (disposal plus diversion)
Municipal Finance		
Potential for Impact on Debt Burden of Municipality	1	<ul style="list-style-type: none"> amount of debenture (long-term) debt annual debt payments as a percentage of Revenue Fund Expenditures (OMB/MMA Guidelines) available debt capacity for other municipal purposes (OMB/MMA Guidelines)
Potential for Impact on Level of Municipal Service	1	<ul style="list-style-type: none"> total municipal wages/salaries, material and contract expenditures expressed as a per household basis current expenditures for each functional department, net inter-department transfers, transfers to reserves, capital costs and debt charges, expressed on a per household basis
Potential for Impact on Local Taxpayers	1	<ul style="list-style-type: none"> total increase in the net general municipal levy net general municipal levy, adjusted for commercial/industrial property assessment, expressed on a per household basis (tax proxy)
Potential for Impact on Municipal Reserve Funds	1	<ul style="list-style-type: none"> total amount of reserves and reserve funds Reserves and Reserve Funds expressed on a per household basis Reserves and Reserve Funds expressed as a percentage of operating expenditures
Potential for Impact on Private Sector Industries	1	<ul style="list-style-type: none"> the total amount of private sector funding applied to each system alternative the amount of additional private sector costs applied to each system alternative the amount of additional private sector costs passed on through higher prices the cost/savings of the system alternative when financed by the private sector through additional taxes, tax incentives, or market/ economic incentives
Natural		
Potential for Effects to Terrestrial Systems and Resources	3	<ul style="list-style-type: none"> potential for loss or removal of terrestrial systems and resources potential for disruption effects to terrestrial systems and resources

TABLE 5.1

GTA 3Rs ANALYSIS
ALTERNATIVE SYSTEM EVALUATION CRITERIA
RESIDENTIAL AND IC&I
(continued)

Criteria Group/Criteria	Rank*	Indicator
Potential for Effects to Aquatic Systems Including Surface and Ground Water Resources	1	<ul style="list-style-type: none"> · potential for loss or removal of aquatic systems including surface water resources · potential for disruption effects to aquatic systems including surface and ground water resources
Potential for Effects to the Atmospheric Environment	1	<ul style="list-style-type: none"> · potential for atmospheric emissions
Service***		
Reliability	1 (1)	<ul style="list-style-type: none"> · proven technology(ies) based on experience in other jurisdictions · degree of reliance on single approach
Flexibility	3 (2)	<ul style="list-style-type: none"> · types and range of quantities accepted · compatibility with Existing system
Performance	1 (1)	<ul style="list-style-type: none"> · quantity diverted or requiring landfilling
Social Acceptability	2 (1)	<ul style="list-style-type: none"> · participation in 3Rs (current and future) by: <ul style="list-style-type: none"> - individuals - municipalities - IC&I sector - special/sensitive groups · attitudes and perceptions toward 3Rs activities · willingness to pay
Social		
Potential Local Community Impacts	1	<ul style="list-style-type: none"> · potential effects on residents · potential effects on special/sensitive groups · potential effects on communities · potential effects on community features
Potential for Broad Social Impact	1	<ul style="list-style-type: none"> · potential for lifestyle changes · potential effect on employment · potential effect on economic development · potential operational effects on institutions, commercial enterprises and industry
Distribution of Social Costs and Benefits	1	<ul style="list-style-type: none"> · distribution of socio-economic effects on industry and population groups · distribution of lifestyle effects · potential future generation effects of system

* "1" represents most important while "3" represents least important.

** Not ranked.

*** Ranking of criteria within the Service Criteria Group distinguished between the residential and IC&I systems. Ranking for IC&I system is indicated in brackets.

5.1.3 Net Effects Analysis

Based on the descriptions of the 3Rs systems and the criteria developed by the study team, a net effects analysis was undertaken for each component contained within each system. This net effects analysis was not specific to Regional conditions, rather it consulted the generic effects and mitigation associated with the components of each system in the context of the larger GTA. Recognizing the amount of overlap among the alternative systems, this approach was undertaken to reduce the number of net effects tables which would be either the same or very similar. Although the components were organized by each of the developed alternative systems, the GTA-based generic net effects were not summarized at the system level. Rather, the net effects were only developed for each of the component *categories*. The component categories served as groupings of similar components (for example the category of residential recycling would have several components within it).

It should be noted that GTA-based generic net effect tables were not generated for the Cost and Municipal Finance Criteria Groupings as it was not possible to assess potential generic impacts for these two groupings.

In developing the net effects, general mitigation and enhancement measures were developed for the types of potential effects identified to avoid, eliminate or minimize negative effects and, where feasible, to enhance the positive effects.

5.2 Metro Toronto Residential Systems Evaluation

The following discusses the Metro Toronto 3Rs system rankings by criteria group.

5.2.1 Cost Criteria Group - Overall System Ranking

Systems 1 to 4 (Existing, Existing/Committed, Direct Cost, Expanded Blue Box) rank highest (i.e. lowest impact), with system costs (measured as cost/household/year) in the \$131 to \$153/household/year range, if disposal costs of \$40/tonne were assumed, and \$174 to \$180/hh/year if disposal costs of \$80/tonne were assumed. Within the accuracy level of this study, these costs were considered equal.

System 5 (Wet/Dry) had a larger range of potential costs, due to the uncertainty of three-stream collection costs. At the lower collection cost it compared to Systems 1 to 4, at the higher collection cost, it compared with System 6B (Mixed Waste Processing). For

cost ranking, System 5 (Wet/Dry) was presented as two sub-systems, System 5A which has a high collection cost, and was lowest ranked, and System 5B, which had a low collection cost, and was highest ranked.

System 6 (Mixed Waste Processing) was the lowest ranked (i.e. highest impact), with an overall system costs of \$237 to \$244/household/year, if the mixed waste system produced a high quality compost, and \$247 to \$266/household/year if the compost quality was poor (i.e. greater quantities of material from the mixed waste plant would be landfilled due to limited end use opportunities).

The following summarizes the system ranking for Metro Toronto with respect to cost (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 1 - System 2 (Existing/Committed)
- 1 - System 3 (Direct Cost)
- 1 - System 4 (Expanded Blue Box)
- 1 - System 5B (Wet/Dry (low collection cost))
- 6 - System 5A (Wet/Dry (high collection))
- 6 - System 6 (Mixed Waste Processing)

5.2.2 Municipal Finance Criteria Group - Overall System Ranking

The highest ranked system was System 1 (Existing). The Existing system would have the least cost impact on the tax payers in Metro Toronto and did not present significant debt costs to the financial structure. System 3A (Direct Cost - revenue neutral), System 3B (Direct Cost - added revenue) and System 4 (Expanded Blue Box) were the third highest ranked systems. While the Direct Cost systems represented very different revenue strategies, the ranking indicated the systems' relative merits. The Direct Cost (revenue neutral) system imposed a low cost per household and did not require significant capital costs, while the Direct Cost (added revenue) imposed a medium cost per household and also added to the reserve fund position. The Expanded Blue Box shared the merits of the Direct Cost (revenue neutral) system which imposed a low cost per household and also did not require significant capital costs.

System 6A (Mixed Waste Processing - low quality compost) was the lowest ranked because it carried with it the highest tax effects and also a very high capital cost, and therefore debt. Similarly, as it is less burdensome, the Mixed Waste Processing (low quality compost) system represented the second lowest ranked system. The third lowest

ranked system was the Wet/Dry system primarily as a result of its impact on debt capacity and municipal reserves.

To confirm the overall ranking, the municipal finance component also undertook a sensitivity analysis on key variables that may affect the criteria indicators. The sensitivity analysis examined variations in capital costs (plus or minus 10% and 20%), rates of waste diversion (plus or minus 5%), variations in operating cost (plus or minus 5% and 10%) differences in waste disposal costs per tonne including the rate Metro Toronto currently charges for solid waste disposal and, finally, household growth which included a no growth scenario. While utilizing the various ranges of indicators presented above, the sensitivity analysis showed that, the general ranking of the systems presented above would not materially change.

The following summarizes the system rankings for Metro Toronto with respect to Municipal Finance (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 2 - System 2 (Existing/Committed)
- 3 - System 3A (Direct Cost [revenue neutral])
- 3 - System 3B (Direct Cost [added revenue])
- 3 - System 4 (Expanded Blue Box)
- 6 - System 5 (Wet/Dry)
- 7 - System 6B (Mixed Waste [high quality compost])
- 8 - System 6A (Mixed Waste [low quality compost])

5.2.3 Natural Environment Criteria Group - Overall System Ranking

Combining the comparative ranking of systems by criterion and the criteria rankings allows an overall system ranking to be completed for the Natural Environment Criteria Group. For each of the three criteria, System 1 was the highest ranked system overall. Systems 2 and 4 (Existing/Committed, Expanded Blue Box) had the same ranking for each of the three criteria. These two systems were both second highest ranked. Systems 2 and 4 were ranked lower than System 1 due to potential effects to terrestrial systems and aquatic systems as a result of siting new 3Rs facilities and discharges from the new compost facility. System 5 (Wet/Dry) was considered only slightly lower ranked than Systems 2 and 4, and third lowest ranked overall. This lower ranking was due to the potential for effects to the atmospheric environment from an increase in the amount of wet waste composted.

System 3 (Direct Cost) was ranked second lowest overall. The Direct Cost system required the same new 3Rs facilities as the Existing/Committed and Expanded Blue Box systems. The higher likelihood of illegal dumping of wastes occurring in the Direct Cost system, and its effects to terrestrial and aquatic systems, was the reason for the lower ranking. When compared to the Wet/Dry system, Direct Cost was also ranked lower. Both System 3 and 5 (Direct Cost, Wet/Dry) required the same new facilities. However, the potential effects to terrestrial and aquatic systems as a result of illegal dumping of wastes within System 3 were expected to be more significant than the increase in emissions to the atmosphere from increased wet waste composting in System 5 (Wet/Dry). Wet wastes were composted in an in-vessel facility.

System 6 (Mixed Waste Processing) was ranked lowest overall for the six systems. This system was expected to have the greatest potential for effects to the atmosphere from mixed waste processing and composting. Similarly, potential effects to aquatic systems were expected to be the greatest of all systems due to siting of the mixed waste facility and discharges from the facility.

The following summarizes the Metro Toronto system ranking from the natural environment perspective (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 2 - System 2 (Existing/Committed)
- 2 - System 4 (Expanded Blue Box)
- 4 - System 5 (Wet/Dry)
- 5 - System 3 (Direct Cost)
- 6 - Systems 6 (A+B) (Mixed Waste Processing)

5.2.4 Service Criteria Group - Overall System Ranking

By considering the systems' ranking by criteria and criteria rankings, an overall system ranking was completed for the Service Criteria Group. Any system that received a mix of lowest and highest rankings for reliability and performance (the two top ranked criteria) were ruled out of contention as highest ranked systems. The ultimate ranking of these systems were then evaluated using social acceptability and flexibility.

Systems 6 (A+B) (Mixed Waste Processing with low and high quality compost) received a highest and second highest ranking for performance, but a lowest ranking for reliability,

and was therefore eliminated from consideration as the highest ranked system. The same was true (in reverse) for the existing and the Existing/Committed systems.

Therefore Systems 3, 4, and 5 were compared to determine the highest ranked, and then the other two systems were ranked. System 4 (Expanded Blue Box) was ranked highest on social acceptability, second highest on reliability, and third highest on performance and was therefore the highest ranked system overall. System 3 (Direct Cost) was considered second highest ranked. It received a similar ranking to System 4 for reliability, but a lower ranking for performance and was also considered less socially acceptable. It also received a lower ranking than System 4 for flexibility (as it handles a narrower range of materials).

System 5 (Wet/Dry) received a higher ranking than Systems 3 and 4 (Direct Cost, Expanded Blue Box) for performance (due to its higher diversion potential) but a lower ranking on reliability. It was considered similar to System 3 (Direct Cost), receiving a second highest ranking for performance combined with a second lowest ranking for reliability. System 3 (Direct Cost) was second highest ranked for reliability, and second lowest ranked for performance. These two systems were considered equal, based on the two most important criteria, and were then compared using other criteria. System 3 (Direct Cost) was second highest ranked for social acceptability, whereas System 5 (Wet/Dry) was second lowest ranked. System 5 (Wet/Dry) was second highest ranked for flexibility, compared to System 2 (Existing/Committed) which was second lowest ranked. Because social acceptability was considered more important than flexibility, System 3 (Direct Cost) was ranked higher than System 5 (Wet/Dry). Therefore System 3 (Direct Cost) was second highest ranked, and System 5 (Wet/Dry) was third highest ranked.

System 2 (Existing/Committed) was considered third lowest ranked. This ranking was determined by comparing System 2 to System 5. System 2 was more socially acceptable than System 5, but because it received a lowest ranked ranking for performance (one of the two most important criteria) it was ranked lower than System 5.

System 1 (Existing) was ranked higher than Systems 6A and 6B (the lowest ranked), but received low rankings for performance, social acceptability and flexibility. Its diversion potential was estimated at 21% to 26%, which is significantly below the provincial 50% target. It was therefore considered the second lowest ranked system overall.

System 6 (A+B) (Mixed Waste Processing with low and high quality compost) were ranked lowest overall. While they received second highest rank on performance (for Systems 6A and 6B respectively), they were each considered lowest ranked on reliability

(a top criterion) and social acceptability. Both were considered highest ranked for flexibility, but this is the criterion considered of least importance.

In summary, the system ranking under the Service Criteria Grouping for Metro Toronto was (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 4 (Expanded Blue Box)
- 2 - System 3 (Direct Cost)
- 3 - System 5 (Wet/Dry)
- 4 - System 2 (Existing/Committed)
- 5 - System 1 (Existing)
- 6 - Systems 6 (A+B) (Mixed Waste Processing)

5.2.5 Social Environment Criteria Group - Overall System Ranking

By considering the systems' ranking by criteria and the criteria rankings (noting that all criteria were ranked equally), an overall system ranking could be completed for the Social Environment Criteria Group based on a qualitative evaluation. The evaluation considered trade-offs among the rankings for each system and criterion recognizing that there may be significant potential effects from the 3Rs systems and the potential effects for each criterion may occur throughout the life of the system and some may continue beyond the planning period.

System 4 (Expanded Blue Box) was the highest ranked system overall. It was ranked highest for the criteria of potential for broad social impact and distribution of social costs and benefits and second highest for the potential local community impacts.

Systems 2 (Existing/Committed) and 3 (Direct Cost) were ranked second highest overall based on their second ranking in all three criteria.

System 5 (Wet/Dry) was ranked third highest on the basis that it was second highest ranked for the distribution of social costs and benefits and third highest ranked system for broad social impact criteria. It ranked as the second lowest for Potential Local Community Impact.

System 1 was ranked as the second lowest primarily because it ranked as the lowest preferred for the broad social impact and distribution of social costs and benefits with this disadvantage being off-set by a highest ranking for potential local community impact.

System 6 was ranked lowest because it was ranked as lowest for the local community impact, second lowest for broad social impact and third highest for distribution of social costs and benefits. In comparison to the other systems, System 6 consistently ranked lower.

The following summarizes the Metro Toronto 3Rs system rankings from the Social Environment perspective (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 4 (Expanded Blue Box)
- 2 - System 2 (Existing/Committed)
- 2 - System 3 (Direct Cost)
- 4 - System 5 (Wet/Dry)
- 5 - System 1 (Existing)
- 6 - Systems 6 (A+B) (Mixed Waste Processing)

5.3 York Region Residential Systems Evaluation

The following discusses the York Region 3Rs system rankings by criteria group.

5.3.1 Cost Criteria Group - Overall System Ranking

Systems 1 to 4 ranked highest equally with system costs (measured as cost/household/year) in the \$124 to \$128/household/year range, if disposal costs of \$40/tonne were assumed, and \$147 to \$163/hh/year if disposal costs of \$80/tonne were assumed. Within the accuracy level of this study, these costs were considered equal.

System 5 (Wet/Dry) had a larger range of potential costs, due to the uncertainty of three-stream collection costs. At the lower collection cost it compared to Systems 1 to 4, at the higher collection cost, it compared with System 6B. For cost ranking, System 5 was presented as two sub-systems, System 5A which had a high collection cost, and was ranked lowest, and System 5B, which had a low collection cost, and was ranked highest.

System 6 (Mixed Waste Processing) is the lowest ranked, with an overall system costs of \$205 to \$210/household/year, if the mixed waste system produces a high quality compost, and \$214 to \$229/household/year if the compost quality is poor (i.e. greater quantities of material from the mixed waste plant are landfilled due to limited end use opportunities).

The following summarizes the system ranking with respect to cost for York Region (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 1 - System 2 (Existing/Committed)
- 1 - System 3 (Direct Cost)
- 1 - System 4 (Expanded Blue Box)
- 1 - System 5B (Wet/Dry (low collection cost))
- 6 - System 5A (Wet/Dry (high collection cost))
- 6 - System 6 (Mixed Waste Processing)

5.3.2 Municipal Finance Criteria Group - Overall System Ranking

The highest ranked system was System 1 (Existing). The Existing system would have the least cost impact on the tax payers in York Region and did not present significant debt costs to the financial structure. System 2 (Existing/Committed) and System 3A (Direct Cost - revenue neutral) were the second highest ranked systems. The Direct Cost (revenue neutral) and Existing/Committed systems impose a low cost per household and do not require significant capital costs. System 4 (Expanded Blue Box) and System 3B (Direct Cost - revenue added) were the third highest ranked.

Systems 6 (A+B) (Mixed Waste Processing) were the lowest ranked because they carry the highest tax effects and also the highest capital cost, and therefore debt. The second lowest ranked system was the System 5 (Wet/Dry) primarily as a result of its impact on debt capacity and local tax payers.

To confirm the overall ranking, the Municipal Finance Criteria Group also undertook a sensitivity analysis on key variables that may affect the criteria indicators. The sensitivity analysis examined variations in capital costs (plus or minus 10% and 20%), rates of waste diversion (plus or minus 5%), variations in operating cost differences (plus or minus 5% and 10%) in waste disposal costs per tonne for solid waste disposal and, finally, household growth which includes a no growth scenario. While utilizing the various ranges of indicators presented above, the sensitivity analysis showed that, the general ranking of the systems presented above would not materially change.

On the basis of the Municipal Finance Criteria Group, the York Region systems were ranked as follows (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 2 - System 2 (Existing/Committed)
- 2 - System 3A (Direct Cost [revenue neutral])
- 4 - System 3B (Direct Cost [added revenue])
- 4 - System 4 (Expanded Blue Box)
- 6 - System 5 (Wet/Dry)
- 7 - Systems 6 (A+B) (Mixed Waste Processing)

5.3.3 Natural Environment Criteria Group - Overall System Ranking

The Existing system (System 1) was highest ranked for each of the three criteria. As a result, this system was highest ranked overall. System 2 (Existing/Committed) and System 4 (Expanded Blue Box) were ranked equal and second highest. These systems were ranked lower than System 1 (Existing) due to potential effects to terrestrial systems and resources, and aquatic systems and water resources, from siting new 3Rs facilities and potential discharges for existing and new compost facilities. System 5 (Wet/Dry) was ranked slightly lower than Systems 2 and 4 and third lowest overall. This system may require a material recovery facility (MRF) in addition to the same facilities included in System 2 (Existing/Committed) and System 4 (Expanded Blue Box). This new facility may result in additional effects to both terrestrial and aquatic systems.

The Direct Cost system (System 3) was ranked second lowest of the systems. This system requires the same new 3Rs facilities as Systems 2 (Existing/Committed) and 4 (Expanded Blue Box). However, this Direct Cost system had a higher likelihood of illegal dumping of wastes, resulting in additional effects to terrestrial systems and aquatic systems. The Direct Cost system was also ranked lower than Wet/Dry since the effects of illegal dumping were considered to be more significant than the potential effects of another new material recovery facility (if required) and the increased emissions to the atmosphere from increased wet waste composting. Wet waste was composted in an in-vessel facility for both systems but at increased quantities in System 5 (Wet/Dry).

System 6 (Mixed Waste Processing) was the lowest ranked system for all three criteria and consequently was ranked lowest overall. This system required the greatest number of new 3Rs facilities resulting in a higher potential for effects to terrestrial systems and aquatic systems. Potential effects to the atmospheric environment from Mixed Waste

Processing were also considered to be greater than emissions from any of the other five systems.

The following summarizes the York Region system ranking from the perspective of the Natural Environment Criteria Group (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 2 - System 2 (Existing/Committed)
- 2 - System 4 (Expanded Blue Box)
- 4 - System 5 (Wet/Dry)
- 5 - System 3 (Direct Cost)
- 6 - Systems 6 (A+B) (Mixed Waste Processing)

5.3.4 Service Criteria Group - Overall System Ranking

By considering the systems' ranking by criteria and criteria rankings, an overall system ranking was completed for the Service Criteria Group. Any system that received a mix of a lowest and highest ranking for reliability and performance (the two top ranked criteria) were ruled out of contention as the highest ranked systems. The ultimate ranking of these systems were then evaluated using social acceptability and flexibility.

Systems 6 (A+B) received the highest ranking for performance, but the lowest ranking for reliability, and were therefore eliminated from consideration as the highest ranked system. The same was true (in reverse) for the Existing system.

System 4 (Expanded Blue Box) was highest ranked on social acceptability, second highest ranked on reliability and performance, and was therefore the highest ranked system overall. System 3 (Direct Cost) was considered second highest ranked. It received a similar ranking to System 4 for reliability and performance, but was considered less socially acceptable. It also received a lower ranking than System 4 for flexibility (as it handles a narrower range of materials).

System 5 (Wet/Dry) was ranked third highest. System 5 received a higher ranking than Systems 3 and 4 for performance (due to its higher diversion potential) but a lower ranking on reliability. This combination results in the system being evaluated on other criteria. It was considered third highest ranked for social acceptability. It was considered more flexible than Systems 3 and 4, but because flexibility is less important, it received a third highest ranking.

Mixed Waste Processing Systems 6 (A+B) were lowest ranked overall. While they received a highest ranking on performance, they were each considered lowest ranked on reliability (a top criterion) and social acceptability. Both were considered highest ranked for flexibility, but this is the criterion considered of least importance.

Systems 1 and 2 (Existing and Existing/Committed) systems were ranked lowest for performance and highest for reliability. These were therefore considered equal to Systems 6 (A+B) for a highest and lowest score combination for these two criteria. They are considered more socially acceptable and less flexible than Systems 6 (A+B). Because social acceptability is considered a more important criterion, it was used to differentiate between the two systems. System 1 (Existing) was therefore considered second lowest ranked, and System 2 (Existing/Committed) third lowest ranked.

In summary, the system ranking for York Region under the Service Criteria Grouping was (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 4 (Expanded Blue Box)
- 2 - System 3 (Direct Cost)
- 3 - System 5 (Wet/Dry)
- 4 - System 2 (Existing/Committed)
- 5 - System 1 (Existing)
- 6 - Systems 6 (A+B) (Mixed Waste Processing)

5.3.5 Social Environment Criteria Group - Overall System Ranking

By considering the systems' ranking by criteria and the criteria rankings (noting that all criteria are ranked equally), an overall system ranking could be completed for the Social Environment Criteria Group based on a qualitative evaluation. The evaluation considered trade-offs among the rankings for each system and criterion recognizing that there may be significant potential effects from the 3Rs systems and the potential effects for each criterion may occur throughout the life of the system and some may continue beyond the planning period.

System 4 (Expanded Blue Box) was highest ranked system overall. It was highest ranked for the criteria of Potential for Broad Social Impact and Distribution of Social Costs and Benefits and second highest for the Potential Local Community Impacts.

System 3 (Direct Cost) was ranked second highest overall based on its second highest ranking for all three criteria.

System 5 (Wet/Dry) was ranked third highest on the basis that it was the second highest ranked for the Distribution of Social Costs and Benefits and for Broad Social Impact criteria. It ranked as the second lowest for Potential Local Community Impact. The only significant difference between System 5 and 3 is that for potential local community impact, System 5 has the additional effects of a new material recovery facility and odour and nuisance effects associated with "wet" waste.

System 2 was ranked second lowest on the basis that it was ranked equal to System 6 for Potential for Broad Social Impact and Distribution of Social Costs and Benefits, but that it was ranked much higher for Potential Local Community Impact.

Systems 1 and 6 were the lowest ranked systems. Due to some of the uncertainties involved in the analysis for each criterion, a judgement could not be made on which of the two systems was better than the other. System 1 ranked the lowest for the Broad Social Impact and Distribution of Social Costs and Benefits with this disadvantage being off-set by a highest ranking for Potential Local Community Impact. System 6 was ranked the lowest for Potential Local Community Impacts and second lowest for both Potential for Broad Social Impact and Distribution of Social Costs and Benefits.

On the basis of the Social Criteria Group, the York Region systems were ranked as follows (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 4 (Expanded Blue Box)
- 2 - System 3 (Direct Cost)
- 3 - System 5 (Wet/Dry)
- 4 - System 2 (Existing/Committed)
- 5 - System 1 (Existing)
- 5 - Systems 6 (A+B) (Mixed Waste Processing)

5.4 GTA IC&I Systems Evaluation

The IC&I systems' evaluation was done in the context of the larger GTA. The following discusses the rankings by criteria group.

5.4.1 Cost Criteria Group - Overall System Ranking

In overall system ranking, total waste management system cost was considered the most important criterion, while the cost per tonne diverted was used to differentiate between

systems, if necessary. On this basis, Systems 1 through to 6 were ranked the same, due to similar overall system costs.

5.4.2 Municipal Finance Criteria Group - Overall System Ranking

Under the Municipal Finance Criteria Group, only the criterion "Potential for Impact on Private Sector Industries" was considered in the IC&I 3Rs systems evaluation. As the total system cost difference among the alternative IC&I systems was relatively minor (\$354 to \$419 million), all IC&I systems were considered to be equal for this criteria group.

It should also be noted that the potential for impact on economic development was addressed under the Social Environment Criteria Group.

5.4.3 Natural Environment Criteria Group - Overall System Ranking

The existing and existing/committed systems (Systems 1 and 2, respectively) were both ranked highest for each of the three criteria. These two systems do not require any new 3Rs facilities, increased vehicle collection requirements or increase in IC&I organics processing. Systems 1 and 2 will result in the lowest potential for effects to the natural environment. Systems 3 and 4 (Extended 3Rs Regulations, Expanded 3Rs Regulations) both require the expansion of existing MRFs or the siting of new MRFs. The siting of these new facilities may result in potential effects to both terrestrial systems and aquatic systems. Increased collection vehicle requirements are also required, resulting in additional emissions to the atmosphere. Systems 3 and 4 were ranked second highest for all these criteria. Overall, Systems 3 and 4 (Extended 3Rs Regulations, Expanded 3Rs Regulations) were also ranked second highest.

IC&I System 5 and System 6 (Expanded 3Rs Regulations with Organics, Processing All IC&I Waste) were both ranked lowest. These two systems required increased processing capacity for dry recyclables and IC&I organics, as well as siting of new MRFs and compost facilities. These systems were expected to have the greatest effects on terrestrial and aquatic systems due to siting new facilities and discharges from the new compost facilities. In addition, they had the largest collection vehicle requirements and the largest amount of IC&I organics processing. Systems 5 and 6 were expected to have the greatest level of emissions to the atmosphere for all of the systems.

The overall IC&I system ranking for the Natural Environment Criteria Group is as follows (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 1 (Existing)
- 1 - System 2 (Existing/Committed)
- 3 - System 3 (Extended 3Rs Regulations)
- 3 - System 4 (Expanded 3Rs Regulations)
- 5 - System 5 (Expanded 3Rs Regulations with Organics)
- 5 - System 6 (Processing All IC&I Waste)

5.4.4 Service Criteria Group - Overall System Ranking

By considering the systems ranking by criteria and the ranking of importance of criteria, an overall system ranking was completed for the Service Criteria Group. Social acceptability, performance and reliability were considered of greatest importance, while flexibility was considered of less importance. Any system that received a mix of a lowest and highest ranking for reliability, performance and social acceptability (the top ranked criteria) was ruled out of contention as a highest ranked system.

Systems 3 and 4 (Extended 3Rs Regulations, Expanded 3Rs Regulations) were the highest ranked systems, using the ranking system discussed above. System 3 ranked highest for social acceptability and second highest for reliability and so, was ranked highest overall. Its performance was third highest, but was greater than 50% diversion, and was therefore considered acceptable. System 4 ranked second highest for social acceptability, while it ranked better than System 3 in terms of performance and flexibility because it diverted a greater range and quantity of materials from a wider selection of industrial sectors. Therefore, on balance it was considered second highest ranked.

Systems 2 (Existing/Committed) was ranked third highest. It was considered the most reliable, but it compared less favourably to Systems 3 and 4 (Extended 3Rs Regulations, Expanded 3Rs Regulations) in terms of performance, social acceptability and flexibility. It ranked higher than System 2 for flexibility and performance, and therefore on balance was also considered to be higher ranked, and was ranked third highest overall.

Systems 6 and 1 (Processing All IC&I Waste, Existing) were lowest ranked, but for different reasons. The performance of System 6 was considered best, but it was considered lowest ranked with respect to reliability and social acceptability. System 1 (Existing) was ranked most reliable, but in terms of performance it was lowest ranked and second lowest ranked for social acceptability. It was considered less flexible than System

6, but because social acceptability is considered a more important criterion, System 1 is considered higher ranked than System 6. Therefore, System 6 (Processing All IC&I Waste) is ranked lowest, and System 1 (Existing) second lowest.

System 5 (Expanded 3Rs Regulations with Organics) was ranked third lowest. Its performance was second highest but it was ranked lower than Systems 2, 3 and 4 in terms of reliability and social acceptability. It was ranked higher than System 1 for flexibility and equal to System 1 for social acceptability, therefore, overall it ranked higher than System 1.

In summary, the IC&I system ranking under the Service Criteria Grouping was (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 3 (Extended 3Rs Regulations)
- 2 - System 4 (Expanded 3Rs Regulations)
- 3 - System 2 (Existing/Committed)
- 3 - System 5 (Expanded 3Rs Regulations with Organics)
- 5 - System 1 (Existing)
- 6 - System 6 (Processing All IC&I Waste)

5.4.5 Social Environment Criteria Group - Overall System Ranking

By considering the systems ranking by criteria and the criteria rankings (noting that all criteria are ranked equally), an overall system ranking could be completed for the Social Environment Criteria Group on a qualitative basis. The evaluation considered trade-offs among the rankings for each system and criterion recognizing that there may be significant potential effects from the 3Rs systems and the potential effects for each criterion may occur throughout the life of the system and some may continue beyond the planning period.

System 2 (Existing/Committed) was the highest ranked system overall. It ranked highest for all three criteria.

Systems 1 (Existing), 3 (Extended 3Rs Regulations) and 4 (Expanded 3Rs Regulations) were ranked equally as the second highest overall. While Systems 3 and 4 were ranked the second highest for all three criteria, System 1 (Existing) was ranked the highest for potential local community impacts, second highest for distribution of social costs and benefits and the third highest for potential for broad social impact. Therefore the systems were ranked equal.

residential waste (with marketing of finished compost), and a policy of Processing all IC&I Waste. This combination could reasonably divert 57.6 million to 63.4 million tonnes (74% to 82%) in the 20-year period. The range relates to the quality of the finished compost from the mixed waste plant, and whether it can be classified for unrestricted use.

In summary, Table 6.1 shows that the combinations of systems examined for Metro Toronto and York Region could divert a range of 30.4 million to 63.4 million tonnes of waste in the Region between 1996 and 2015. This translates to 39% to 82% of the Metro Toronto and York Region waste stream.

7.0 CONCLUSIONS

Section 15 of the *Waste Management Act*, 1992 (WMA) stipulates that the environmental assessments for the IWA landfill waste disposal sites are to contain, among other matters, a description of, a statement of rationale for, and a description and evaluation of any matter relating to reduction, reuse and recycling of waste (3Rs) as an alternative to the landfill waste disposal sites. The GTA 3Rs Analysis provides such a description and evaluation of possible 3Rs systems, and the results appear in Sections 5.2 and 5.3 of this summary report.

The Act (Section 14) also stipulates that for each site proposed by the IWA as an undertaking, the Minister of the Environment (and Energy) is to provide a written estimate to the IWA as to the amount of waste expected to be diverted from the proposed landfill waste disposal site by waste reduction, and by waste reuse and recycling. These estimates were provided by Minister's letter dated May 15, 1992. The GTA 3Rs Analysis EA Input Document provides additional analysis of 3Rs activities in support of the waste diversion estimates previously provided.

Specifically, the study has shown that when combined, each of the possible Metro Toronto and Region of York systems examined (IC&I plus residential), could result in a source reduction of 7.3 million tonnes representing a 9% diversion rate. Through reuse and recycling efforts, 23.1 million to 56.1 million tonnes could reasonably be diverted. This translates to 30% to 72% of the waste stream. When reduction and reuse/recycling efforts are combined, the 25 combinations of residential and IC&I systems for Metro Toronto and York Region could divert a range of 30.4 million to 63.4 million tonnes of waste, or 39% to 82% of the waste stream.

System 5 (Expanded 3Rs Regulations with Organics) was ranked as the second lowest overall on the basis that it was the second highest for the potential for broad social impact, second lowest for the potential local community impacts and lowest for the distribution of social costs and benefits.

System 6 (Processing All IC&I Waste) was the lowest ranked, because it was ranked the lowest for all three criteria.

A list of the overall IC&I system ranking for the Social Environment Criteria Group follows (highest ranked [i.e. lowest impact] to lowest ranked [i.e. highest impact]):

- 1 - System 2 (Existing/Committed)
- 2 - System 1 (Existing)
- 2 - System 3 (Extended 3Rs Regulations)
- 2 - System 4 (Expanded 3Rs Regulations)
- 5 - System 5 (Expanded 3Rs Regulations with Organics)
- 6 - System 6 (Processing All IC&I Waste)

6.0 DIVERSION ESTIMATES FOR METRO TORONTO AND YORK REGION

The diversion potentials for each service area depend on which residential and IC&I systems are combined to form any waste diversion system.

Excluding the Existing system (as both the residential and IC&I Existing systems will be replaced by the Existing/Committed systems by 1996), there are five residential and five IC&I systems which could be combined 25 different ways for each service area. The cumulative tonnes (1996 to 2015) of waste that could be diverted through reduction and reuse/recycling, and the cumulative diversion rate (expressed as a percentage of total waste generated) by service area, were estimated for each of these system combinations. Table 6.1 illustrates these combinations and diversion rates.

At the low end of the range, the combination of Existing/Committed residential and IC&I systems could divert an estimated 39% of the waste generated between 1996 and 2015, by the year 2015. This totals 30.4 million tonnes of diversion in the 20-year period, made up of an estimated 23.1 million tonnes (30%) of waste reused/recycled, and 7.3 million tonnes (9%) of waste reduced.

Other combinations of residential and IC&I systems achieve higher diversions. The highest potential diversion is achieved by the combination of Mixed Waste Processing of

TABLE 6.1

SUMMARY OF DIVERSION DATA FOR COMBINATION OF
 RESIDENTIAL AND IC&I SYSTEMS
 METRO TORONTO AND YORK REGION

Scenario		Cumulative Diversion (2015)							
		Reduction		Reuse/Recycling		Total Diversion			
Residential	IC&I	%	tonnes (millions)	%	tonnes (millions)	%	tonnes (millions)		
Existing/ Committed	Existing/ Committed	9%	7.30	30%	23.08	39%	30.38		
	Extended 3Rs	9%	7.30	39%	30.41	49%	37.72		
	Expanded 3Rs	9%	7.30	44%	34.30	54%	41.60		
	Expanded 3Rs with Organics	9%	7.30	48%	36.89	57%	44.19		
	No Unprocessed Waste to Landfill	9%	7.30	53%	40.77	62%	48.07		
Direct Cost	Existing/ Committed	9%	7.30	34%	26.76	29.24	34.07	36.54	
	Extended 3Rs	9%	7.30	44%	34.10	36.57	41.40	43.88	
	Expanded 3Rs	9%	7.30	49%	37.98	40.46	45.28	47.76	
	Expanded 3Rs with Organics	9%	7.30	52%	40.57	43.05	47.87	50.35	
	No Unprocessed Waste to Landfill	9%	7.30	57%	44.45	46.93	51.76	54.23	
Expanded Blue Box	Existing/ Committed	9%	7.30	36%	27.97	31.00	35.28	38.30	
	Extended 3Rs	9%	7.30	46%	35.31	38.33	42.61	45.64	
	Expanded 3Rs	9%	7.30	51%	39.19	42.22	46.50	49.52	
	Expanded 3Rs with Organics	9%	7.30	54%	41.78	44.80	49.09	52.11	
	No Unprocessed Waste to Landfill	9%	7.30	59%	45.66	48.69	52.97	55.99	
Wet/Dry	Existing/ Committed	9%	7.30	40%	31.40	31.75	38.71	42.06	
	Extended 3Rs	9%	7.30	50%	38.74	42.09	46.04	49.39	
	Expanded 3Rs	9%	7.30	55%	42.62	45.97	49.93	53.28	
	Expanded 3Rs with Organics	9%	7.30	58%	45.21	48.56	52.51	55.87	
	No Unprocessed Waste to Landfill	9%	7.30	63%	49.09	52.45	56.40	59.75	
Mixed Waste Processing	Existing/ Committed	9%	7.30	42%	32.57	38.43	39.87	45.73	
	Extended 3Rs	9%	7.30	51%	39.90	45.76	47.21	53.07	
	Expanded 3Rs	9%	7.30	56%	43.79	49.65	51.09	56.95	
	Expanded 3Rs with Organics	9%	7.30	60%	46.38	52.24	53.68	59.54	
	No Unprocessed Waste to Landfill	9%	7.30	65%	50.26	56.12	57.56	63.42	

The estimates of waste diversion for Metro Toronto and York Region show that of the 25 options considered, 21 have the ability to divert 50% or more of the generated waste stream in the 20-year period between 1996 and 2015.

The analysis further shows that the written estimates provided by the Minister of Environment to the IWA in May 1992, fall within the range of waste diversion achievable by a number of combinations of residential and IC&I systems within Metro Toronto and York Region.

The systems presented and evaluated were not designed as plans for any of the Regions or service areas. They were chosen to estimate the impacts of a number of different possible approaches to waste diversion. They are not considered a complete list of all possible combinations of components which could form waste diversion systems, and a comprehensive mix and match of components has not been attempted. The systems were chosen to provide a reasonable range of diversion options, and to estimate the impacts of these options.

For More Information

Copies of the complete draft GTA 3Rs Analysis documentation, including technical appendices, are available for review at the IWA Information Centres and other public locations such as libraries and municipal offices within the Greater Toronto Area.

Additional copies of this report, or Summary Reports for the other service areas, may be obtained by calling the following telephone numbers:

Durham Region IWA Information Centre:	1-800-661-9294
Metro Toronto/York Region Information Centre:	1-800-463-8484
Peel Region IWA Information Centre:	1-800-361-5448

APPENDIX A

MOEE Minister's May 15 1992, Letter



Ministry
of the
Environment

Ministère
de
l'Environnement

May 15, 1992

135 St. Clair Avenue West
Suite 100
Toronto, Ontario
M4V 1PS
416-323-4359

135, avenue St. Clair ouest
Bureau 100
Toronto (Ontario)
M4V 1PS
416-323-4359

Ms. Jan Rush, Chair
Interim Waste Authority,
20 Bay Street, Suite 1625,
Toronto, Ontario.
M5J 2N8

Dear Ms. Rush:

In accordance with section 14 of the Waste Management Act, 1992, shown below are estimates of the cumulative amounts of waste that will be diverted from disposal over the period 1996 to 2015 due to waste reduction, and reuse and recycling. All numbers are in millions of tonnes.

Waste Diversion Estimate

Reduction Reuse & Recycling

Metropolitan Toronto and York Region	18.7	18.1
Peel Region	5.2	6.2
Durham Region	2.6	3.9

Yours sincerely,

Ruth Grier
Minister



